3. DATA VALIDATION RESULTS

To determine the ultimate utility of data, the following indicators were evaluated:

3.1 PRECISION, ACCURACY, REPRESENTATIVENESS, COMPARABILIITY, COMPLETENESS AND CONSISTENCY

3.1.1 PRECISION

Precision is a quantitative determination of the reproducibility of an analytical value. For this program, collocated samples are collected to assess overall precision of the sampling, preparation and analytical process, and matrix spike/matrix spike duplicates are required to address aliquoting reproducibility in order to provide information on matrix reproducibility otherwise unobtainable from samples reported below the reporting limits. Matrix spikes also provide an indication of the accuracy of native results: this will be discussed in the accuracy section.

The collocated samples further address the ability to obtain a representative sample of the medium studied, this will be discussed further in the representativeness section. For elemental parameters, the methods require the preparation of laboratory replicates at a specified frequency to address aliquoting precision.

For laboratory replicates the Guidelines specify the utilization of difference criteria for samples providing values below a limiting value and relative percent difference (RPD) criteria for samples providing values above a limiting value. The Guidelines utilize 5X the contract required detection limit (CRDL). These specifications are as follows:

When either one or both of the analyses provide results below the limiting value, the following criteria apply:

$$|S - R| \leq CRDL$$

Where: S = sample value
R = replicate sample value

When both of the analyses provide results above or equal to the limiting value, the following criteria apply:

$$RPD = (|S - R|/S + R)200 \leq 20$$

Where: RPD = Relative Percent Difference

The QAPjP provides an RPD specification of 20 percent for laboratory replicates for elements, but does not provide specific criteria for low level results or collocated samples. The Guidelines do not provide precision criteria for collocated samples. The technical reviewer utilized the 20 percent RPD criteria specified in the QAPjP and Guidelines and the low-level criteria above specified in the Guidelines with the substitution of the laboratory reporting limit (RL) for the CRDL where they differed. For collocated samples, the technical reviewer utilized the 2 RL and RPD <30 criteria specified in the USEPA Region I Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses, June 13, 1988.

For this event all replicate sample precision was within specification.

For this event the following are collocated samples:

SDG	SAMPLE	COLLOCATED SAMPLE
10316058	507177	507600
10316268	507156	507601

Note: All parameters were reported to standard laboratory reporting limits (PQL) which approximate estimated quantitation limits (EQL) specified in the methods. The technical reviewer utilized the PQL values to conduct the precision analysis.

For this event all collocated sample precision was within specification.

For all parameters, the laboratories reported to their practical quantitation limits (PQL) and for levels below the PQL to the method detection limit (MDL) flagged with a "J" qualifier. The MDL described in 40 CFR Part 136, Appendix B and incorporated by reference in SW-846, provides a precision of ± 100 percent. With some exceptions the PQL values used by the laboratory, approximate the estimated quantitation limit (EQL) which is established at approximately 5-10X the MDL in SW-846. At 5X the MDL the EQL precision is approximately ± 30 percent. As a result reported positive but below the PQL, but above the MDL should be considered estimates. ***The project manager is cautioned that the imprecision associated with the project-required reporting conventions must be taken into consideration when utilizing the data below the PQL.***

3.1.2 ACCURACY

Accuracy is the proximity of the reported analytical value to the true concentration in the sample. To estimate the proximity factor, laboratory control, laboratory blank and environmental samples are fortified with the parameter of interest, and for organics analysis, each sample is also fortified with surrogate indicators, and the level recovered, expressed as a percentage of the spiking level, is utilized. For laboratory control samples (LCS), the analytical values must be within either a published range or within laboratory or method established windows about the true concentration.

If these conditions are not met, the method is to be considered out of control, corrective action taken, and the entire process repeated with compliant LCS before the associated data can be reported. For elements, laboratory blanks are spiked with low-level reference materials for ICP (CRI). According to the Guidelines associated analytical values must fall within ± 20 percent of the true value or all the potential impact on all environmental sample results associated with the non-compliant CRI must be evaluated during technical review using professional judgment. The technical reviewer has considered that all associated sample results reported at values <2PQL are evaluated for CRI recoveries <80

percent, both positive results and non-detects are flagged as estimated with the potential for low bias (J-), and for CRI recoveries >120 percent, positive results only are flagged as estimated with the potential for high bias (J+).

For the recovery of spiked parameter from environmental samples, the quantity of parameter matrix spiked (MS) must be large enough to be uniquely distinguishable from the level of native analyte present in the sample. When this condition exists, if the recovery value is outside established values, all associated environmental samples are flagged as estimated (J) with an indication of bias direction during technical review. The Guidelines establish that the native level of analyte must be less than four times the spiking level for valid accuracy estimation.

The formula utilized is as follows:

Percent Recovery = ((SSC - USC)/CS))100

Where: SSC = Spiked Sample Concentration
USC = Unspiked Sample Concentration
CS = Concentration Spiked

For elements, the QAPjP establishes acceptance criteria at 70-130 percent that are less stringent than the 75-125 percent specified in the Guidelines. The QAPjP does not specify accuracy criteria for water quality parameters. The technical reviewer has utilized the laboratory-derived limits, as required by SW-846 methods, and the more stringent 75-125 percent criteria specified in the Guidelines where laboratory-established limits were not provided for the water quality parameters.

For elements analyzed by ICP, the method requires assessment of matrix interference by performing serial dilution analyses in addition to the matrix spike indicated above. The Guidelines suggest that, for samples containing sufficient signal in the undiluted sample (>50IDL) that the diluted result should be within 10 percent of the undiluted value to verify absence of interference.

Initial and continuing calibrations are performed to verify instrument performance and stability prior to and during the analysis of environmental samples. The Methods require that the initial calibration linearity coefficients are $\geq$ 0.995, the continuing calibration stabilities are within 90-110 percent and, for elements, the Guidelines require consideration of blanks indicating a negative instrument drift >|IDL|. The technical reviewer has utilized the flagging criteria suggested in the Guidelines for lack of linearity and continuing calibration stability, and has utilized professional judgment for actions for non-compliant instrument drift associated with samples with levels reported at <5 IDL.

For SDG 10316058 the positive results reported <2 PQL for cadmium in samples 507131 and 507114 were flagged as estimated with the potential for high bias (J+) and the result reported for total selenium in sample 507131 was flagged as estimated with the potential for low bias (J-) due to non-compliant CRI recoveries. ***These results are considered usable when the bias factors are taken into account. Doing so will have no impact on the decision since the adjusted values for cadmium and un-adjusted value for selenium are below the Standards.***

For SDG 10316058 sample 507114 provided MS/MSD recoveries of potassium above the upper limit. The positive results reported for this element in all samples associated with the SDG are flagged as estimated with the potential for high bias (J+). ***These results are considered usable when the bias factors are taken into account. Doing so will have no impact on the decision since no Standard is established for this element.***

For SDG 10316058 sample 507114 provided ICP serial dilution stability for potassium above the upper limit at approximately 21% D. The results reported for this element in all samples associated with the SDG are flagged as estimated (J) to signify the potential for high bias (J+). ***These results are considered usable when the bias factors are taken into account. Doing so will have no impact on the decision since no Standard is established for this element.***

For SDG 10316268 the positive results reported <2 PQL for cadmium in samples 507166, 507113, 507168, and 507104 were flagged as estimated with the potential for high bias (J+) and the results reported for total selenium in samples 507156, 507601, and 507157 were flagged as estimated with the potential for low bias (J-) due to non-compliant CRI recoveries. ***These results are considered usable when the bias factors are taken into account. Doing so will have no impact on the decision since the adjusted values for cadmium and un-adjusted value for selenium are below the Standards.***

For SDG 10316058 sample 507114 provided MS/MSD recoveries of fluoride (IC) below the lower limit. The results reported for this parameter in all samples associated with the SDG are flagged as estimated with the potential for low bias (J-). ***These results are considered usable when the bias factors are taken into account. Doing so will have no impact on the decision since no Standard is established for this parameter.***

For SDG 10316268 sample 507123 provided MS/MSD recoveries of fluoride (IC) and nitrate-N and sample 507157 provided MS/MSD recoveries of chloride and nitrate-N below the lower limit. The results reported for these parameters in all samples associated with the SDG are flagged as estimated with the potential for low bias (J-). ***These results are considered usable when the bias factors are taken into account. Doing so will have no impact on the decision since no Standard is established for this parameter.***

For this event all additional accuracy criteria were met.

3.1.3 REPRESENTATIVENESS

To perform a valid environmental assessment, the samples, when analyzed, must be representative of the media under study. Factors influencing representativeness include preparation of wells prior to sampling to obtain aliquots of the groundwater strata of interest. This is accomplished through purging of standing water to constant temperature, conductivity and pH prior to collecting the sample. Collocated samples are also collected

to provide information regarding the ability to reproducibly collect a sample. If reproducibility is not obtained, representativeness is not verified. The sample must be collected with uncontaminated equipment, placed in uncontaminated containers, and not contaminated throughout the transport, receipt, storage, preparation and analytical processes. Evaluation of the potential for contamination is conducted through collection of field blanks, and utilization of laboratory process blanks. Once the sample has been collected, it is maintained in such a state that changes are not expected to occur in its concentration of target parameters. This is accomplished by chemical and physical preservation, and minimization of time from collection to analysis.

A review of the sample receipt logs indicate that preservation requirements were met, therefore, no action was taken.

Blanks were reported with some elements present at concentrations that generated action levels resulting in the flagging of the positive values reported for several samples as not-detected (U) at the reported values. ***These results are considered usable as maximum potential concentrations.***

3.1.4 COMPARABILITY

The characteristic of comparability reflects both the internal consistency of measurements and the expression of results in units that are consistent with other organizations reporting similar data. Each value reported for a given measurement should be similar to other values within the same data set and with other related data sets. Comparability was assured through the use of standardized sampling procedures and USEPA analytical methods.

3.1.5 COMPLETENESS

Completeness is a measure of the extent of attainment of usable data points from an investigation. For this program a completeness goal of 85 percent is established in the

QAPjP. The ability to obtain a sample, (human) error and sample characteristics are major contributors to reduced completeness. For this investigation, all intended samples were collected and received by the laboratory. The laboratory analyzed all of the samples for all of the intended parameters. Completeness for this event is, therefore, 100 percent.

3.1.6 CONSISTENCY

Consistency is a measure of the reasonableness of data to those that have been previously generated. For this program, an extensive data base has been developed that allows the evaluation of analytical results that may represent historical outliers. Based on a comparison to the historical results, a few sporadic differences were noted for this monitoring event; however, the overall results are within the existing variance.

4. REFERENCES

FMC, 1999. "RCRA Interim Status Groundwater Monitoring Plan", Bechtel Environmental, August 1999; as updated in the RCRA Post-Closure Plans as follows:

- Pond 9E post-closure plan, January 2000;
- Slag Pit Sump post-closure plan, September 2001;
- Pond 8E, Phase IV Ponds and Pond 15S post-closure plans, May 2002;
- Pond 16S post-closure plan, July 2003; and,
- Pond 17 and Pond 18 Cell A post-closure plans, August 2004.

USEPA, 2004. Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, Final, USEPA, OSWER, EPA 540-R-04-004, October 2004.

USEPA, Contract Laboratory Program Statement of Work for Inorganics Analysis, Document Number ILM02.0 and latest revisions.

USEPA, 1989. Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses, USEPA Region I, June 13, 1988, Modified by Deborah Szaro, et. al. February 1989.

USEPA, 1983. Methods for Chemical Analysis of Water and Wastes, EMSL, EPA-600/4-79-020, Revised March 1983.

USEPA, 1986. Test Methods for Evaluating Solid Waste, OSWER, SW-846, Third Edition, November 1986.

APPENDIX A

TECHNICAL REVIEW REPORTS

ENVIRONMENTAL CHEMISTRY CONSULTANTS, INC

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Data Technical Review Report

Groundwater Samples

FMC Corporation, Pocatello, Idaho

East Michaud Flats RFI

Third Quarter 2015

SDGs 10316058 and 10316268

23 August 2015

Prepared by: Bruce K. Wallin, PhD

This memo summarizes the technical review of groundwater results generated by PACEMN for FMC's third quarter 2015 Resource Conservation and Recovery Act (RCRA) sampling event for the laboratory SDGs listed above. The samples associated with all SDGs were analyzed for elements and wet chemistries.

Laboratory analyses were performed in accordance with the U.S. Environmental Protection Agency (USEPA) SW-846 Methods and methods from Standard Methods for Examining Water and Wastewater and Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020, Revised March 1983 and. All of the above methods are hereafter referred to as "Methods". A list of the parameters and associated methods utilized is provided in Table 1-1.

TECHNICAL REVIEW REPORT

SDG 10316058

ELEMENTAL PARAMETERS

TECHINCAL REVIEW REPORT

SDG 10316058

ELEMENTAL PARAMETERS

The data evaluation was based on USEPA SW-846 Method 6010B for cadmium, and potassium, and 6020 for arsenic and selenium (Methods) and included the following parameters:

- calibration
- blanks
* - ICP interference check sample
- matrix spike analysis
- duplicate sample analysis
* - laboratory control sample analysis
- ICP serial dilution analysis
* - ICPMS internal standard analysis
- detection limits
- overall assessment

* All criteria were met for this parameter.

Table A-1 summarizes the technical review actions that are detailed below.

Data validation, described in SW-846 and the Guidelines, which includes an evaluation of the usability of technically reviewed results with respect to project Data Quality Objectives and site chemistry knowledge, is included in the Data Validation/Usability Report.

CALIBRATION:

Low-level calibrations (CRI) providing recoveries not within 90-110% are tabulated below:

CRI ID.	ELEMENT	RECOVERY (%)
8-3/00:25	cadmium	123.4
	potassium	84.8
7-31/16:31	selenium	114.6
8-7/03:20	selenium	83.8

Associated samples requiring actions:

CRI ID	ELEMENT	ASSOCIATED SAMPLES	
8-3/00:25	cadmium	507131	507114
8-7/03:20	selenium (total)	507131	

Action:

- For recovery above the upper limit positive results reported <2 PQL are flagged as estimated with the potential for high bias (J+).
- For recovery below the lower limit results reported <2 PQL are flagged as estimated with the potential for low bias (J-).

Comment:

Only calibrations bracketing samples associated with this SDG are evaluated.

BLANKS:

Blanks providing positive results and their associated action levels (AL) are tabulated below:

BLANK ID.	ELEMENT	CONCENTRATION (mg/L)	AL (mg/L)
CCB 7-30/18:15	potassium	0.146	0.705
CCB 7-30/18:48	potassium	0.224	1.12
CCB 8-3/01:55	potassium	0.521	2.61
CCB 8-3/02:34	potassium	0.205	1.03
CCB 8-3/03:09	potassium	0.360	1.80
507CDI	potassium	0.28	1.4

Associated samples with positive results reported below the action level: NONE

Comments:

Only calibration blanks bracketing the samples associated with the SDG were evaluated.

MATRIX SPIKE ANALYSIS:

Samples providing matrix spike (MS)/MS duplicate (MSD) recoveries or precision not within the laboratory-established limits when the native level is reported at less than four times the spiking level are tabulated below:

SAMPLE ID.	ELEMENT	MS/MSD RECOVERY (%)
507114	potassium	140/176

Action:

- For both MS and MSD recoveries above the upper limit positive sample results reported for the element are flagged as estimated with the potential for high bias (J+).

Comments:

The above action is applied to all environmental samples associated with the SDG.

DUPLICATE SAMPLE ANALYSIS:

Comments:

For this SDG sample 507600 is collocated with sample 507177. For this collocated sample pair all precision limits specified in the QAPP were met.

ICP SERIAL DILUTION ANALYSIS:

Samples containing more than 50 MDL of analyte providing 5X serial dilution values differing by more than 10% (%D) are tabulated below:

SAMPLE ID.	ELEMENT	%D
507114	potassium	20.7

Action:

- Results reported for the analyte are flagged as estimated (J).

Comments:

The diluted value was smaller than the undiluted value, therefore, high bias is indicated.

The above action is applied to all environmental samples associated with the SDG.

DETECTION LIMITS:

For this SDG, the laboratory was required to report results to their method detection limit (MDL). The MDL (described in 40CFR Part 136, Appendix B and incorporated by reference in SW-846), provides an error band, by definition, of $\pm$ 100 percent. The Estimated Quantitation Limit (EQL), is established at 5-10X the MDL in SW-846.

Action:

- Positive results reported between the MDL and PQL are flagged as estimated (J).

Comments:

The data user is cautioned that these results may not be analytically reproducible or statistically valid.

OVERALL ASSESSMENT:

The positive results reported <2 PQL for cadmium in samples 507131 and 507114 are flagged as estimated with the potential for high bias (J+) due to non-compliant CRI recovery.

The result reported <2 PQL for total selenium in sample 507131 is flagged as estimated with the potential for low bias (J-) due to non-compliant CRI recovery.

The positive results reported for potassium in all environmental samples are flagged as estimated with the potential for high bias (J+) due to non-compliant MS/MSD recoveries.

The results reported for potassium in all environmental samples associated with the SDG are flagged as estimated (J) due to non-compliant serial dilution reproducibility.

Positive results reported between the MDL and PQL are flagged as estimated (J) due to uncertainty at the low level.

All additional QC results reviewed were within specification and no further actions or qualifiers were necessary.

TABLE A-1.

TECHNICAL REVIEW ACTION SUMMARY

SDG 10316058

Arsenic	
Cadmium	J1, J+1
Potassium	J2, J+2
Selenium	J-1

If the field is left blank no actions or qualifications were necessary.

J1	-	Positive result is flagged as estimated (J) due to uncertainty at the low level.
J2	-	Result is flagged as estimated (J) due to non-compliant serial dilution reproducibility.
J+1	-	Positive result <2 PQL is flagged as estimated with the potential for high bias (J+) due to non-compliant CRI recovery.
J+2	-	Positive result is flagged as estimated with the potential for high bias (J+) due to non-compliant MS/MSD recoveries.
J-1	-	Result <2 PQL is flagged as estimated with the potential for low bias (J-) due to non-compliant CRI recovery.

TECHNICAL REVIEW REPORT

SDG 10316268

ELEMENTAL PARAMETERS

TECHINCAL REVIEW REPORT

SDG 10316268

ELEMENTAL PARAMETERS

The data evaluation was based on USEPA SW-846 Method 6010B for cadmium, potassium, and phosphorus and 6020 for arsenic and selenium (Methods) and included the following parameters:

- calibration
- blanks
* - ICP interference check sample
- matrix spike analysis
- duplicate sample analysis
* - laboratory control sample analysis
* - ICP serial dilution analysis
* - ICPMS internal standard analysis
- detection limits
- overall assessment

* All criteria were met for this parameter.

Table A-2 summarizes the technical review actions that are detailed below.

Data validation, described in SW-846 and the Guidelines, which includes an evaluation of the usability of technically reviewed results with respect to project Data Quality Objectives and site chemistry knowledge, is included in the Data Validation/Usability Report.

CALIBRATION:

Low-level calibration standards (CRI) providing recoveries not within 90-110% are tabulated below:

CRI ID.	ELEMENT	RECOVERY (%)
8-3/00:25	cadmium	123.4
	potassium	84.8
8-7/03:20	selenium	83.8
8-7/14:31	selenium	85.2

Associated samples requiring action: (cadmium) - 507166, 507113, 507168, 507104; (selenium) - 507156, 507601, 507157

Action:

- For recovery above the upper limit positive results reported <2 PQL for the element are flagged as estimated with the potential for high bias (J+).
- For recovery below the lower limit results reported <2 PQL for the element are flagged as estimated with the potential for low bias (J-).

Comment:

Only calibrations bracketing samples associated with this SDG are evaluated.

BLANKS:

Blanks providing positive results and their associated action levels (AL) are tabulated below:

BLANK ID.	ELEMENT	CONC. (mg/L)	AL (mg/L)
CCB 8-3/01:06	potassium	0.245	1.23
CCB 8-3/01:55	cadmium	0.00068	0.0034
	potassium	0.521	2.61
CCB 8-10/09:34	potassium	0.710	3.55

BLANK ID.	ELEMENT	CONC. (mg/L)	AL (mg/L)
CCB 8-10/10:12	potassium	0.600	3.00
507CDI	potassium	0.28	1.4
507701	potassium	0.14	0.70

Associated samples with positive results reported below the action level: (cadmium) - 507166, 507113, 507168, 507104

Action:

- Positive results are flagged as not-detected at the reported value (U).

Comments:

Only calibration blanks bracketing samples associated with the SDG were evaluated.

MATRIX SPIKE ANALYSIS:

Comments:

For sample 507157 the native level of potassium exceeded four times the spiking level, therefore, this parameter could not be evaluated.

DUPLICATE SAMPLE ANALYSIS:

Comments:

For this SDG sample 507601 is collocated with sample 507156. For this collocated sample pair all precision limits specified in the QAPP were met.

DETECTION LIMITS:

For this SDG, the laboratory was required to report results to their method detection limit (MDL). The MDL (described in 40CFR Part 136, Appendix B and incorporated by reference in SW-846), provides an error band, by definition, of $\pm$ 100 percent. The Estimated Quantitation Limit (EQL), is established at 5-10X the MDL in SW-846.

Action:

- Positive results reported between the MDL and PQL are flagged as estimated (J).

Comments:

The data user is cautioned that these results may not be analytically reproducible or statistically valid.

OVERALL ASSESSMENT:

The positive results reported <2 PQL for cadmium in samples 507166, 507113, 507168, and 507104 are flagged as estimated with the potential for high bias (J+) due to non-compliant CRI stability.

The results reported <2 PQL for selenium in samples 507156, 507601, and 507157 are flagged as estimated with the potential for low bias (J-) due to non-compliant CRI stability.

The positive results reported for cadmium in samples 507166, 507113, 507168, and 507104 are flagged as not-detected at the reported value (U) due to blank contamination.

Positive results reported <PQL are flagged as estimated (J) due to uncertainty at the low level.

All additional QC results reviewed were within specification and no further actions or qualifiers were necessary.

TABLE A-2.

TECHNICAL REVIEW ACTION SUMMARY

SDG 10316268

Arsenic	
Cadmium	J1, J+1, U1
Potassium	
Selenium	J-1
Phosphorus	

If the field is left blank no actions or qualifications were necessary.

J1	-	Positive result <PQL is flagged as estimated (J) due to uncertainty at the low level.
J+1	-	Positive results <2 PQL are flagged as estimated with the potential for high bias (J+) due to non-compliant CRI stability.
J-1	-	Results <2 PQL are flagged as estimated with the potential for low bias (J-) due to non-compliant CRI stability.
U1	-	Positive result is flagged as not-detected at the reported value (U) due to blank contamination.

TECHNICAL REVIEW REPORT

SDG 10316058

WET CHEMISTRIES

TECHNICAL REVIEW REPORT

SDG 10316058

WET CHEMISTRIES

The data evaluation was based on the procedures set forth in the Methods and included the following parameters:

* - holding times
* - calibration
* - blanks
- matrix spike sample analysis
* - standard reference material analysis
- duplicate sample analysis
- detection limits
- overall assessment

* All criteria were met for this parameter.

Data validation, described in SW-846 and the Guidelines, which includes an evaluation of the usability of technically reviewed results with respect to project Data Quality Objectives and site chemistry knowledge, is included in the Data Validation/Usability Report.

A glossary of data qualifier definitions is presented in Appendix B.

MATRIX SPIKE SAMPLE ANALYSIS:

Samples providing matrix spike (MS)/MS duplicate (MSD) precision or recoveries not within the laboratory default limits when the native level is reported at less than four times the spiking level are tabulated below:

SAMPLE ID.	PARAMETER	MS/MSD RECOVERY (%)
507172	o-phosphate-P	16/
507114	fluoride (IC)	82/55

Action:

- For both MS and MSD recoveries below the lower limit sample results reported for the parameter are flagged as estimated with the potential for low bias (J-).

Comments:

For recovery no action is applied when only one of the MS/MSD pairs is out of specification.

The above actions are applied to all environmental samples associated with the laboratory group in the SDG.

For sample 507114 the native levels of chloride and sulfate exceeded four times the spiking level, therefore, this parameter could not be evaluated.

For sample 507172 the native levels of chloride, nitrate-N, and sulfate exceeded four times the spiking level, therefore, this parameter could not be evaluated.

DUPLICATE SAMPLE ANALYSIS:

1. Field Duplicates:

Comments:

For this SDG sample 507600 is collocated with sample 507177. For this collocated sample pair all precision limits specified in the QAPP were met.

2. Samples analyzed for fluoride by IC and ISE:

Samples 507131 and 507114 were analyzed for fluoride by both IC and ISE Methods. For these samples the ISE Method provided results considerably lower than the IC Method. Only the results from the ISE Method should be used.

DETECTION LIMITS:

For this SDG, the laboratory was required to report results to their method detection limit (MDL). The MDL (described in 40CFR Part 136, Appendix B and incorporated by reference in SW-846), provides an error band, by definition, of ± 100 percent. The Estimated Quantitation Limit (EQL) is established at 5-10X the MDL in SW-846.

Action:

- Positive values reported between the MDL and PQL are flagged as estimated (J).

Comments:

Any values below the PQL contain inherently increasing error bands as the numbers become smaller. It is essential that the data user considers these statistical impacts on data quality at the low levels.

OVERALL ASSESSMENT:

Sample 507114 provided MS/MSD recoveries of fluoride (IC) below the lower limit. The results reported for this parameter in samples 507147, 507148, 507149, 507128, 507127, 507126, 507124, 507131, and 507114 associated with the Batch are flagged as estimated with the potential for low bias (J-).

Any values reported positive between the MDL and PQL are flagged as estimated (J) due to uncertainty at the low levels.

All additional QC criteria evaluated were within specification and no further actions or flagging were required or deemed necessary.

TECHNICAL REVIEW REPORT

SDG 10316268

WET CHEMISTRIES

TECHNICAL REVIEW REPORT

SDG 10316268

WET CHEMISTRIES

The data evaluation was based on the procedures set forth in the Methods and included the following parameters:

* - holding times
* - calibration
* - blanks
- matrix spike sample analysis
* - standard reference material analysis
- duplicate sample analysis
- detection limits
- overall assessment

* All criteria were met for this parameter.

Data validation, described in SW-846 and the Guidelines, which includes an evaluation of the usability of technically reviewed results with respect to project Data Quality Objectives and site chemistry knowledge, is included in the Data Validation/Usability Report.

A glossary of data qualifier definitions is presented in Appendix B.

MATRIX SPIKE SAMPLE ANALYSIS:

Samples providing matrix spike (MS)/MS duplicate (MSD) recoveries or precision not within the laboratory default limits when the native level is reported at less than four times the spiking level are tabulated below: